

DOCUMENT RESUME

ED 039 754

56

EM 008 090

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 TITLE Technologies for Learning.
 INSTITUTION Academy for Educational Development, Inc.,
 Washington, D.C.
 SPONS AGENCY Office of Education (DHEW), Washington, D.C. Bureau
 of Research.
 BUREAU NO BR-8-0571
 PUB DATE [70]
 NOTE 32p.; This is one of the support papers for "To
 Improve Learning; a Report to the President and the
 Congress of the United States by the Commission on
 Instructional Technology", ED 034 905

EDRS PRICE MF-\$0.25 HC-\$1.75
 DESCRIPTORS *Instructional Media, *Instructional Technology,
 *Learning

ABSTRACT

As we experiment with uses of technology, we must resist a simplistic view of the venture. Technologies are more than means to ends. They change our goals, for they change our very natures as organisms. It is believed that educators cannot refrain from extensive technological innovation. In doing so, however, they must sensitize themselves to the fact that the changes will ramify in profound and unpredicted ways. P. A. Meisler herein presents an inventory of promising and as yet unassimilated educational technologies, and discusses some of the general issues and puzzles that appear to be important to a consideration of technology in education. The inventory: audiotape, overhead transparencies, slides, motion pictures, intermedia configurations, and multimedia configurations. (GO)

TECHNOLOGIES FOR LEARNING

by Richard A. Meisler*

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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I. INTRODUCTION

In the midst of a society pervaded by technology, the American educational community is in the process of assessing the ways in which it can use a variety of available technologies. If technology can help to improve the quality or efficiency of our educational programs, then American education, pressed by the large number of students involved in its great experiment in mass education, can sorely use that help. But the technology would be even if we did not of many students question of forced upon us have the problems and high costs.

We do, after all, live in the most highly technological society in history. Our students have assimilated technology into their lives more fully and comfortably than any previous generation. It is therefore valid to wonder whether an educational system without radical and technological changes can effectively reach such a student population. I doubt that it can.

I would like to present an inventory of promising and as yet unassimilated educational technologies, and also to

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discuss some of the general issues and puzzles that appear to be important to a consideration of technology in education. But it is appropriate to begin with a few comments concerning the things that are to be included under the heading of "educational technology," "instructional technology" or, as I would prefer, "technologies for learning."

I wish to include techniques that are not "instructional" in a narrow sense. For example, a great deal is learned from participation in certain simulation games, but the games do not instruct in the simple ways in which certain types of lectures or educational films do. In other words, the "learning" in "technologies for learning" is to be construed broadly.

Nor do I wish to include only activities that involve mechanical or electronic devices. For I do wish to include programmed instruction, even when it is not presented in a machine format. And I also believe that sensitivity training and other types of group learning experiences are parts of the new technologies for learning. Programed instruction and sensitivity training organize our energy and activities in new ways on the basis of knowledge of how we learn and grow.

CIRCLE NUMBERS

32490	37230	46790	53240	64270	81870
37090	39100	48530	55140	67240	86500
37170	43830	53660	56600	73260	88050

They are therefore as much a part of our educational technology as any projector.

II. AN INVENTORY OF TECHNOLOGIES FOR LEARNING

A. AUDIO-VISUAL MEDIA

1. AUDIOTAPE
2. OVERHEAD TRANSPARENCIES
3. SLIDES
4. MOTION PICTURES
5. INTERMEDIA CONFIGURATIONS
6. MULTIMEDIA CONFIGURATIONS

Tape recordings (and long-playing records), slides, films and overhead projections are widely used in the presentation of lectures and lessons. When they are well prepared and skillfully used they unquestionably improve instruction by conveying an expanded range of substantive materials through their images and sound. Even if these devices did not bring new subjects and phenomena into the classroom, they would be important for the interest and excitement they add to a teacher's efforts.

In their simple uses these media tend to be viewed as teachers' aids. This view can be limiting if the teacher feels that the media materials can never stand alone, that they must always be thoroughly assimilated into his own lesson. Some films and tapes are remarkably effective

"There goes a very sincere individual!!"

instructional tools as they stand, and the good teacher need feel no reluctance or guilt about letting these materials speak for themselves. Another way of stating this is that some teachers feel that unless all the activities in their classroom bear their personal stamp, then their students are being cheated. On the contrary, a teacher may best contrast the training that is based on a learning group of peers, in a classroom with the traditional classroom with the teacher as a group of charges. serve his students or tape avail an authority figure and the cases by making a film getting out of the way. able to them, and then

We will use the term "intermedia configurations" to describe combinations of the common audio-visual media when they are used to present tightly programed units of instruction. A tape and slide presentation may be used, for example, to illustrate the use of a laboratory technique or to give an analysis of a textual passage. Intermedia configurations are often used to guide students through a set of activities, not only to present a body of information. These presentations can be independent and self-sufficient units of instruction, which may be used by individual students or groups without an instructor's presence. Major advantages of intermedia

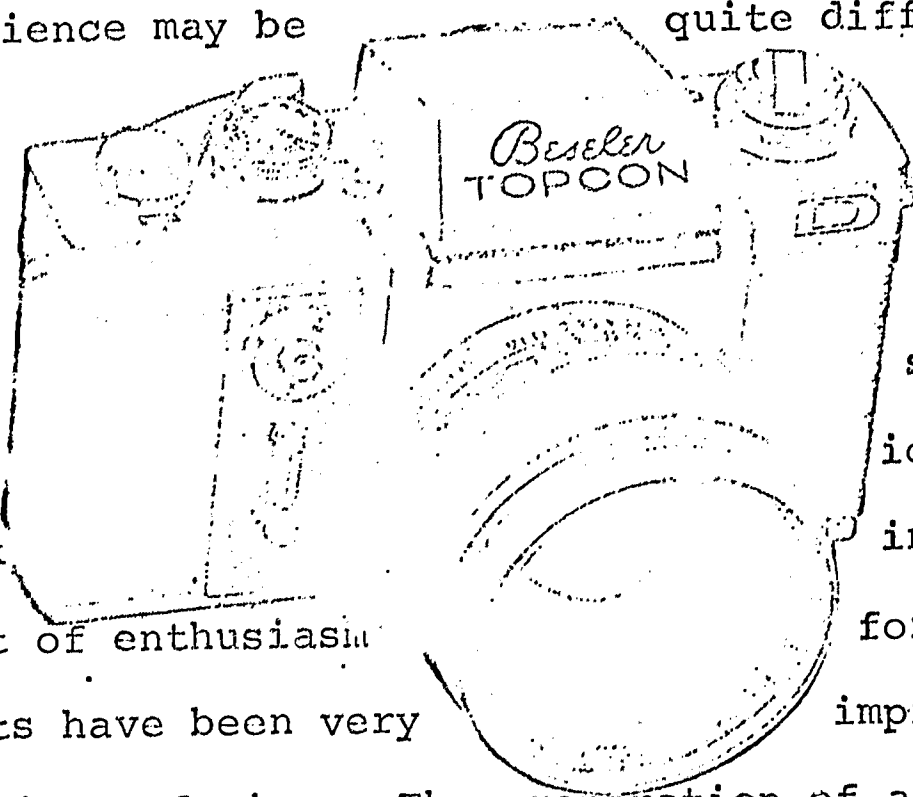
Which picture best expresses the idea?
You'll decide which of these pictures best illustrates the meaning of the word "speed."

configurations are that such units may be prepared to very high levels of quality in terms of visual images, oral presentation, and instructional logic. In some cases subject matter may be presented which would be difficult or impossible to exhibit without the media. These presentations may also be made randomly accessible to students, thus allowing them at the student's leisure. This characteristic becomes especially important if large numbers of intermedia presentations are available, for they may then be used in various combinations and for diverse purposes.

When they are well prepared, intermedia configurations may rival or surpass the instruction of an excellent teacher. But common audio-visual media may be employed in other less conventional ways, to exploit some of their creative and aesthetic potential, and to deal with subject matters in ways which employ less familiar instructional logics. I use the term "multi-media configurations" to refer to uses of the media whose internal structure is closer to that of an artistic event or happening than to that of an instructor's lesson.

Multi-media configurations tend to use a great deal of equipment, and to immerse participants in a complex media-created environment. The multi-media presentation may have a fairly linear and discursive message. But it may also be more complex; it may be a media massage, to refer to McLuhan's pun. The involvement of each member of the audience may be quite different and unique.

On
students
prepare
presentat
their work
simply out of enthusiasm



occasion
have chosen to
such multi-media
ions as part of
in a course or
for the new form.

The results have been very impressive from several points of view. The preparation of a presentation turns out to be a fine means by which a student can demonstrate what he has learned in a course or seminar. It is a most effective and engaging way to share one's learning. And the process of preparing a multi-media presentation is invariably an intense learning experience, for it involves asking basic questions about the subject matter as the available materials are altered, arranged and ordered. As is the case with most of our technology for learning, these media seem

to become most productive when the student rather than the teacher gains control and acts as the designer of the materials.

B. PROGRAMED INSTRUCTION

1. BOOK FORMAT
2. TEACHING MACHINE FORMAT
3. COMPUTER-ASSISTED INSTRUCTION

COMPUTERS HAVE MAGNETIC PERSONALITIES.
COMPUTER PROGRAMS ARE RERUN.
A COMPUTER IS WELL ORGANIZED. IT HAS A SYSTEM.
A COMPUTER'S SCOPE IS LIMITED. YOU HAVE TO PUNCH A COMPUTER TO MAKE IT WORK.
COMPUTERS ARE KEYED UP.
GOVERNMENT COMPUTERS ARE TIED UP IN MAGNETIC TAPE.
A COMPUTER CAN'T BEAT THE SYSTEM.

The strengths and weaknesses of programed instruction are by now well known. The engagement of the student's active response, the careful articulation of the logic of a subject matter, and the opportunity for the student to work alone and at his own rate all contribute to making programed instruction an effective learning technology. Many people have found programed instruction to be boring and tedious. It remains to be seen whether the state of the art advances to a point at which most programed instruction will be more pleasant and interesting.

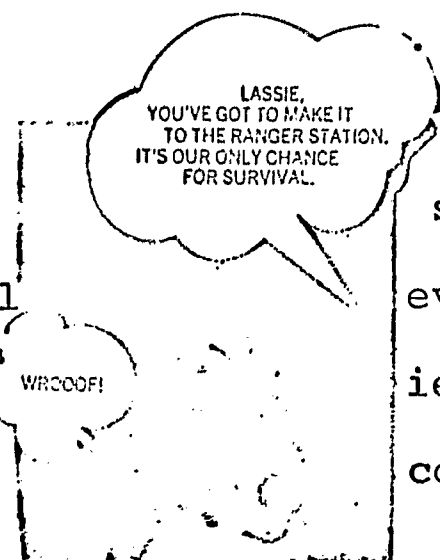
Acknowledgment and thanks
are due to Professor Keith
McGary, Chairman of the
Department of Philosophy,
Antioch College. He has been
visionary in the theories and
practices of technologies for
learning. I and many others
have learned a great deal
from him.
*
* --R.M.*

There is little doubt that computer-assisted programed instruction will overcome some of these limitations. Computerized systems for programed instruction are coming progressively

closer to the ideal of handling a large number of student-constructed responses, thus freeing programed instruction from the fairly rigid and uninspiring format of the multiple-choice question. Computerized systems can handle much more complex branching and, in general, a more sophisticated range of instructional strategies than other programed instruction formats. The computer can also respond to each student in the light of its record of the student's earlier performance. At present the computer is a medium for the communication of programed instruction. At some point in the future it will become a unique and complex technology for learning in its own right. It is hard to speculate on the characteristics of that learning technology, but we do know that it will be capable of presenting highly individualized instruction, it will handle large and complex bodies of information, and it will offer a wide variety of approaches to learning.

D. CLOSED-CIRCUIT TELEVISION AND VIDEOTAPE RECORDING

Private television has been used for some time now in schools and universities. Closed-circuit television and videotape have offered universities a solution to large enrollments in courses. One mode of use



vision has been used for schools and universities. evision and videotape have ies a solution to large courses. One mode of use

is to record an instructor's lecture at the beginning of the day and then to replay it several times in many classrooms. Sometimes a library of lectures or lessons is accumulated, and the tapes made available to groups or individuals. Some large university systems broadcast their instructional programs. In all of these patterns the instructor usually behaves exactly as he would in the classroom in the absence

of television cameras.
This behavior is
waste of resource
Television introduced

Vacation in an Experimental Society

eras.
a tragic
s.
uces the

possibility of employing a wide range of visual materials and production techniques.

Our students have grown up accustomed to learning and acquiring a great deal of information from television, and

commercially with great skill and
failure to abandon standard
presentation in favor of those
to television results in the loss
of learning and student involvement
in private television's great

this medium is used
sophistication. Our
classroom modes of
that are better suited
of a significant amount
ement. The first step
ive use will probably

When I try to teach, as I do sometimes, I am appalled by the results, which seem a little more than inconsequential, because sometimes the teaching seems to succeed. When this happens I find that the results are damaging. It seems to cause the individual to distrust his own experience, and to stifle significant learning. Hence I have come to feel that the outcomes of teaching are either unimportant or hurtful.

--Carl Rogers

be to remove the teacher from the screen and to make him a member of a production team which will include writers, announcers, artists and media professionals. Private television offers the capability of reach-

ing a large student population, but this potential must be pursued simultaneously with the development of television characteristic strengths and styles of presentation;

otherwise we will be reaching a great many students with instruction of an obviously inferior quality. An excellent classroom lecture may well be mediocre when presented unaltered on television.

Private television offers a set of educational opportunities even more unusual than those represented by its potential as a creative medium for teacher-to-student instruction. Videotape recording permits individuals

In a real sense, a disc jockey is a model for the teacher today just as the preacher was in an earlier day. Like the preacher, the DJ has his technology which the teacher needs to share. The preacher had his voice, his stock of allusions and his pulpit; these the teacher usurped and used for different ends. The DJ has his own technology which needs to be appropriated by the teacher. The DJ has the equipment to keep his show moving--he has many turn-tables, he has tape loops, he has his script, he has his engineer, he has his writers, and he has his own talking. The task of his four-hour stint is to keep things moving--keep information before the listener: it does not matter what the contents are. His job is to get involvement: get the audience involved, pass along the word: where the In place is, what the In mode of dress is, the whole bit. A DJ works interminably to reach his audience; he does not spend his time purifying the message. He gets involvement just as the preacher got the involvement of his day.

--Keith McGary

or groups to observe themselves. Videotape can offer a person or a group far

An important situation, for example, is the normal class or seminar discussion, in which the dynamics of the group may be observed and analyzed. Significant phenomena and patterns of behavior, even those that ordinarily pass unnoticed, become quite obvious. They may be understood and dealt with when they are negative, and built upon and strengthened when they are positive.

Many people remember the shock and surprise of first hearing their voices on tape.

Videotape can offer a more useful (and surprising) information.

Groups that have an

Meeting the

Challenge

explicit introspective orientation, i.e. groups that are partially or wholly committed to examining and learning from their own operations, can find that a videotape facility is an elegant and powerful resource. Videotape recording offers the

individual teacher an important opportunity to criticize and improve his own classroom work. Videotape is, in general,

an important tool in many situations, ranging from those in which self-understanding is the goal, to those in which learning a specific skill (e.g. public speaking, interviewing, selling)

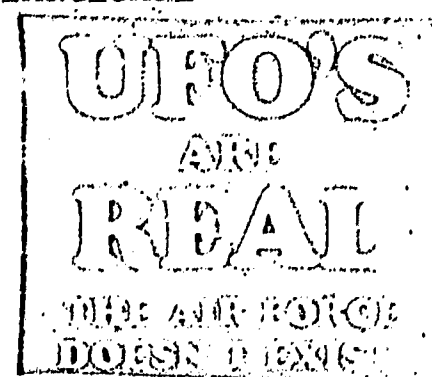
is sought. On some college campuses there are also movements to explore the aesthetic potential of video-recording; this holds enormous promise for the enrichment of a community's cultural life.

Technology

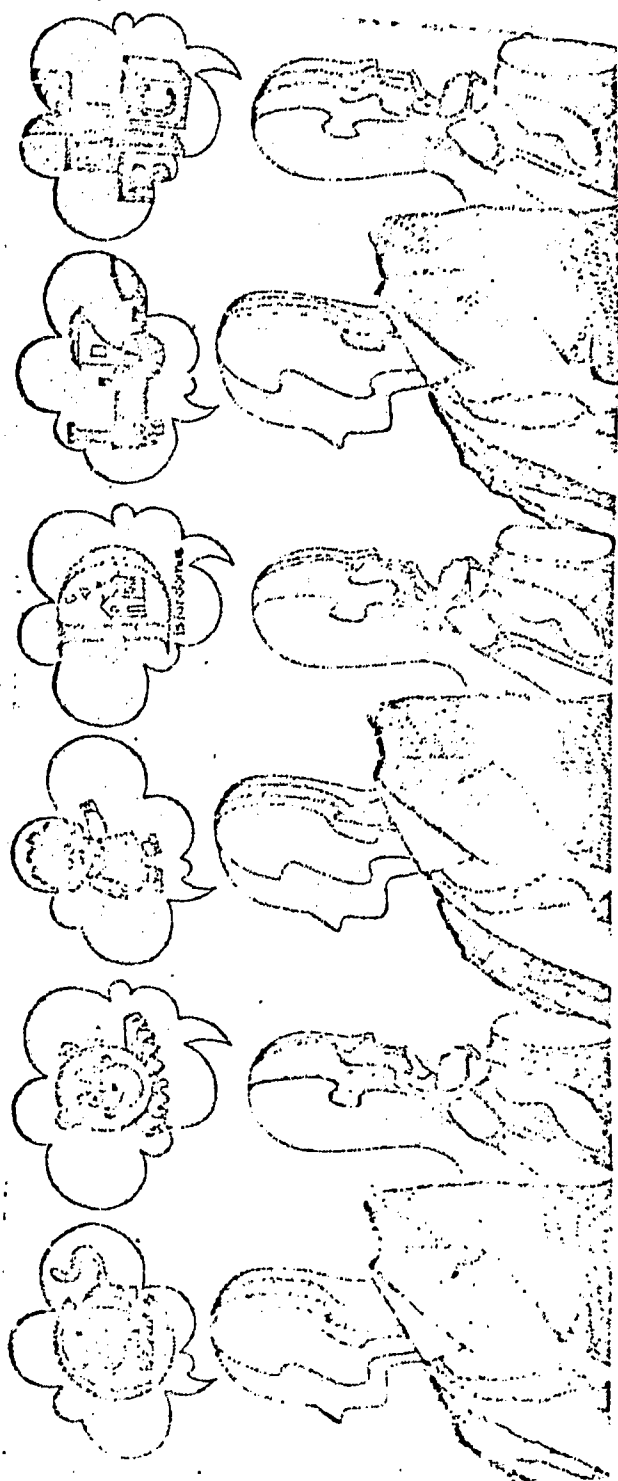
D. GAMES AND SIMULATIONS

This is a rapidly developing and very exciting field. The full range of subject matters that supports game or simulation

is not yet clear, but I would judge it to be quite large. Various sorts of social systems, from a business corporation in an economic environment to an international organization in time of war, have been simulated in game formats. But games are not limited to subjects in the social realm; the properties of certain biological systems have been taught by games, as have parts of algebra and symbolic logic.



It may be helpful to mention, as examples, two of the many games I have tried with college-age groups. On several occasions we have used the Inter-Nation Simulation (INS), which may be the most widely used and one of the most complex games available in the social sciences. Players in INS work on teams, each team representing a nation. Rules and responsibilities within each team are divided up among players, with special rules dealing with economics, diplomacy, military affairs, etc. The game consists of time periods during which players must make economic, military, and diplomatic decisions, the results of which



are calculated and returned to the teams according to a fairly complex mathematical model of international relations and economics. Students finish the game with a greater understanding of the principles of international relations, especially as postulated in the INS model, as well as with a greater appreciation of the emotional and interpersonal dimensions of the subject.

INS, like many other games, elicits a tremendous amount of enthusiasm and excitement.

Well, here we are ... me, the dirty rotten daughter of a University President ... and you, a dirty rotten History Teacher! It's two o'clock in the morning and we've just returned from a Faculty Party to our dirty rotten home!

Right! And now, we're going to play dirty rotten games for the rest of the night! Because, through these games, the author plans to dramatically strip away our facades and reveal the fulsome phantasmagoria of base rot that permeates our souls!



Another example is a RAND Corporation simulation that I used in a non-disciplinary seminar on the future. Participants played the roles of national policy-makers allocating units of resource among development projects for different types of technology. In making resource-allocation decisions students had to try to predict the social results of each set of technological developments. In another part of the simulation, groups representing different segments of the population evaluated, from their perspectives, the predicted social consequences of specific technologies. Discussions became quite intense, as assumptions concerning the future, values, and the nature of technology were challenged.

It is interesting to note that the field of educational games and simulations is a spin-off of war-game techniques used by the military, of computer simulation money, arms renewed arms race

techniques used by engineers and physical scientists, and of simulation approaches to social systems used in social scientific research. One natural result is that some simulations are computer based, thus involving some very complicated and sophisticated models of the subject matter. This is one of the most promising frontiers in the use of computers in education.

Most observers are extremely impressed by the enthusiasm and commitment elicited by many educational games. Although we have little hard data on the effectiveness of these games, we have some reasonable speculations.

Simulations probably help participants to appreciate the

functional meaning of theories and

principles as they operate in concrete situations. Many teachers are reluctant to use simulations or games until all of the principles of the subject matter have been mastered discursively. Such caution is probably unwarranted, and may deprive students of the opportunity to arrive at general principles through induction from concrete circumstances. Another interesting aspect of games is that the resultant learning is often social

in nature, i.e. students learn together as they collaborate as team members. Participants develop a real interest in the competence and understanding of their colleagues. A result is that students teach each other in a natural and enjoyable situation.

*pattern learning
and relationship thinking*

*to expand
sensory*

motor and

Perceptual skills;

(I have often interrupted, after an hour, an educational game being played by people who were initially strangers. Invariably I can point out that they are communicating about and helping each other deal with the subject matter on a level of comfort and good feeling that would usually take months of regular classroom association to achieve.)

August

Many simulation games like INS involve students with a theoretical model of the subject matter. One of the most important stages in the use of games is the examination, after the game is over, of the characteristics and limitations of the model. Participants may approach this examination by observations of what the rules of the game did or did not let them do, how realistic these rules are, and how realistically the consequences of one's moves are determined by the game's structure.

Some individuals or groups are able to get into the activities of altering old games or constructing new ones. Such ventures amount to attempts to create functioning and "playable" theoretical models of a subject matter. It is hard to over-estimate the extent to which this involves the search for basic insights into the subject matter.

On a theoretical level we have good reason to believe that the urge to play in young (and old) organisms is an extremely adaptive learning process.

Play has a natural attraction for all of us, and its roots are intimately bound up with our need to learn in order to survive.

Developments that allow us to return to and tap this part of our nature in the formal process of education have tremendous potential.

"Granting that childhood is playhood, how do we adults generally react to this fact? We ignore it, we forget all about it - because play to us is a waste of time. Hence we erect a large City School with many rooms and expensive apparatus for teaching; but more often than not, all we offer to the play instinct is a small concrete space."

*A.S. Neill
Summerhill*

E. MASS MEDIA

1. BROADCASTING

A. TELEVISION

B. RADIO

2. LONG-PLAYING RECORDS

3. MAGAZINES AND NEWSPAPERS

*reaching people,
teaching people...
with*

America

"Educational" broadcasting, whether sponsored by a university, school system, or educational

network, has generally suffered from the failure to use

the television or radio medium with imagination. As discussed earlier,

there has been a stifling allegiance to traditional educational formats

like lectures and panel discussions. The educational broadcasting net-

works have begun to move beyond these limitations, however; and they are achieving some very notable successes.

Whereas some schools and universities make good use of the available educational broadcasting offerings, educators largely ignore commercial broadcasting. Many

of the criticism of the broadcasting "wasteland" are valid. Nevertheless, there is an important portion of television and radio programs that would enrich and be useful to almost any educational setting. Network news and special affairs programs are often excellent, and many programs do have significant artistic content. Also one role of education is surely

Land of instant replay

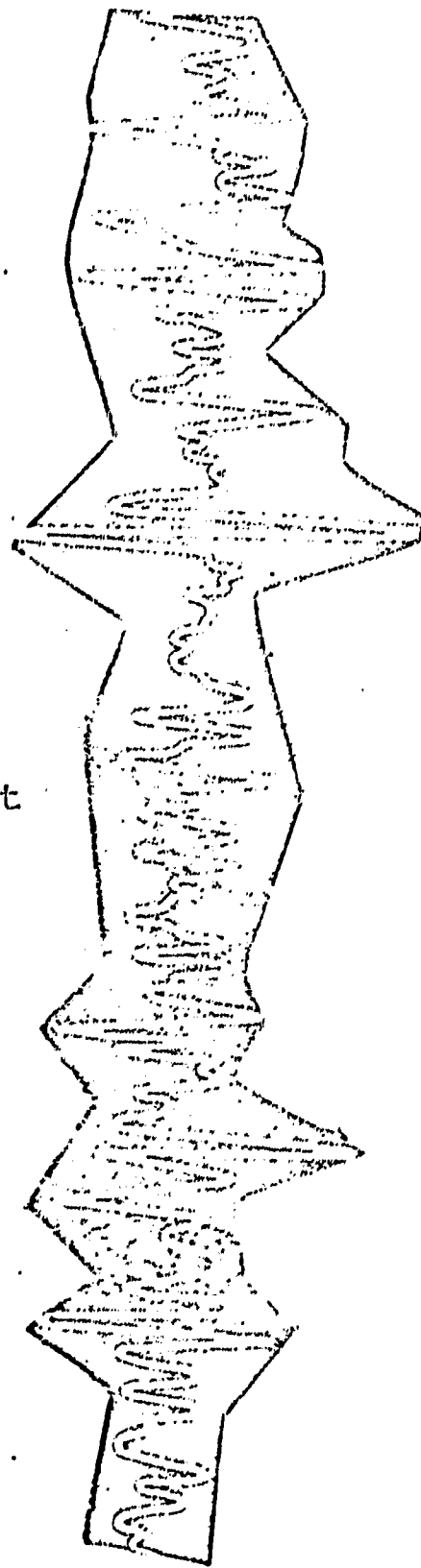
*From the mountains.
To the prairies.
Success, stereo and surfing
(on the oceans white with foam).
O, say can you see op, pop
and color TV.*

*Hear ye rock, soul, folk,
rhythm and blues,
and crown thy good
with brotherhood,
beards and burns.
America, America.*

Electric Circus

the examination and criticism of popular culture in order to assist the student to probe and become aware of the cultural forces acting upon him. From this perspective it would be important to bring a wide sample of broadcasting matter into the educational environment, including programs which one would judge to be of low quality.

The availability and cost of both videotape and audiotape recorders make it possible for an educational institution to use commercial materials repeatedly to a convenient schedule. *Four-Channel Sound* and according to it is unfortunate that schools and colleges do not have continuing policies and facilities for making a wide range of radio and television programs routinely available to their teachers and students. How realistic is an educational system that insulates itself almost totally from the most vital and effective communications media of society? Similar comments apply to the printed mass media and long-playing records.



F. SENSITIVITY TRAINING

We will use "sensitivity training" as a shorthand term to refer to a range of new *A New Life Cycle* or experimental techniques

designed to help people to understand themselves and to relate to each other better. This field is remarkable for its enthusiastic adherents and also for its vehement critics. This is not the *A meeting of gods* place for a review of the evidence on either side or for an *A language* attempt to make sense of the controversies surrounding sensitivity *a new face* training. Let it suffice to point to a congruence between the professed aims of American education and the goals of

exploring inner space.

sensitivity training.

Many of our educational institutions reject a narrow definition of their mission. they are, they claim, interested in more than the development of the human intellect. They are concerned with the "whole man," with the liberation of creativity, the training of moral sensibilities, the ability of an individual to understand himself and to relate to others in a productive and satisfying fashion. Sensitivity training is intended to be responsive to many of these matters. It therefore seems reasonable that those segments of the educational community professing interest in these broader constructions of the aims of education should consider sensitivity training techniques as a possibly useful technology for learning, as a set of activities and structures that might be fully integrated into the fabric of their institutions and programs.

G. ELECTRONIC COMMUNICATIONS

Amplified telephone and its auxiliary devices for transmitting written or visual information are quite promising. They have helped schools and colleges to overcome their physical isolation and their remoteness from the learning resources of people and events.

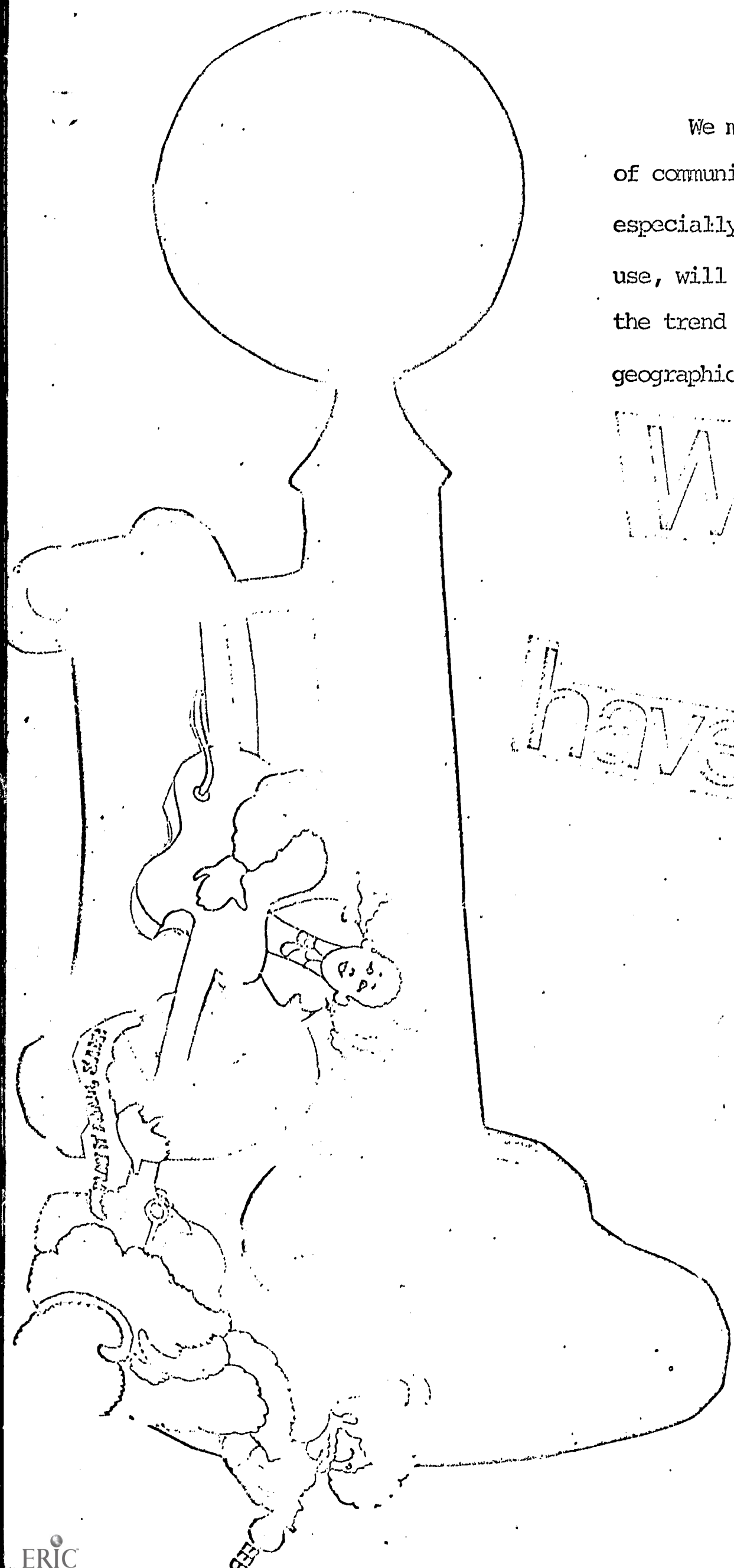
All of the arts,
poetry, music,
ritual,
the visible arts,
the theatre,
must singly and
together
create
the most comprehensive
art of all, a
humanized society
and
its masterpiece,
free man, II
— Bernard
Berenson.

We may expect that the advance of communications technology, especially as satellites come into use, will continue and strengthen the trend towards overcoming the geographical isolation of learners.

We could

have stopped

the world



H. XEROGRAPHY

The advent of inexpensive means for reproducing
images

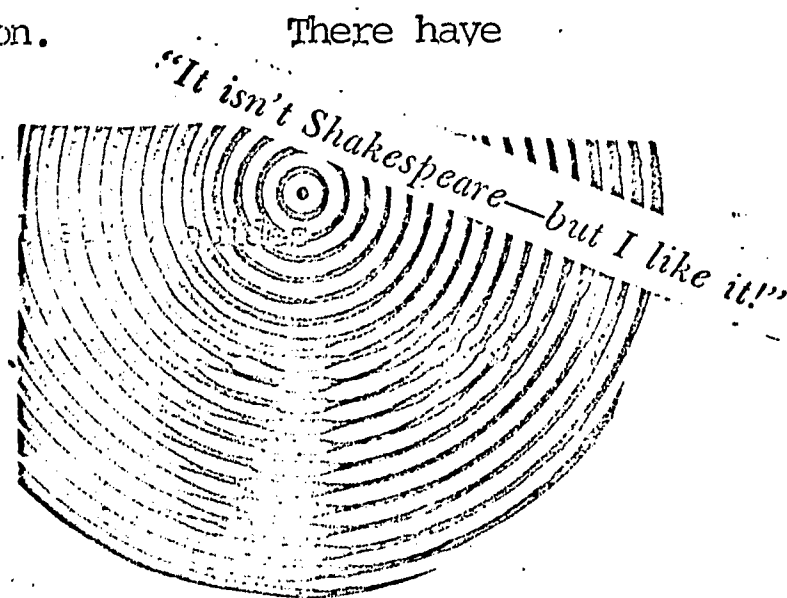
on paper offers a range of new opportunities for teachers and students. In addition to the ease with which original or existing printed material may be distributed, image and print reproduction may be used as a creative medium to stimulate learning or to exhibit its results. In a sense we have overcome the high costs and technical expertise associated with the publication of materials, for small and moderate numbers of people.

I. INDEPENDENT STUDY MATERIALS

There have been many projects in recent years involving the extensive use of independent study. Such projects have used a number of the techniques described above, such as independently available audio-visual units and programmed instruction.

There have also been special study guides and independent study syllabi developed. The educational community has accumulated a significant body of experience with independent study. The following types of questions have been asked: To what

extent should the student be responsible for the initial definition of the independent study project? What are the most effective manners for an instructor to



intervene and support a project, and how frequently should this be done? What are the best ways to help a student explore the available human and other resources for his study? What processes are successful in the evaluation of an independent study project? To what extent should the definition of an independent study be open to alteration during its execution?

Many of these questions may have valid answers. It must also be recognized, however, that attempts to systematize independent study activities can be destructive. Independent intellectual work is risky. Attempts to diminish the risks too greatly or to control independent activities too aggressively can emasculate the whole enterprise.

J. SPEED READING AND EFFECTIVE
STUDY TRAINING

There seem to have
been breakthroughs
made in recent years
in both these fields.

We would be doing many of our
students a great service if we could
integrate such instruction into many
or most of our educational institutions
without attaching to them the stigma
associated with "remedial" work.

SPENDING
TURNS YOUR MIND INTO A
MENTAL MAGNET

K. PHOTOGRAPHY

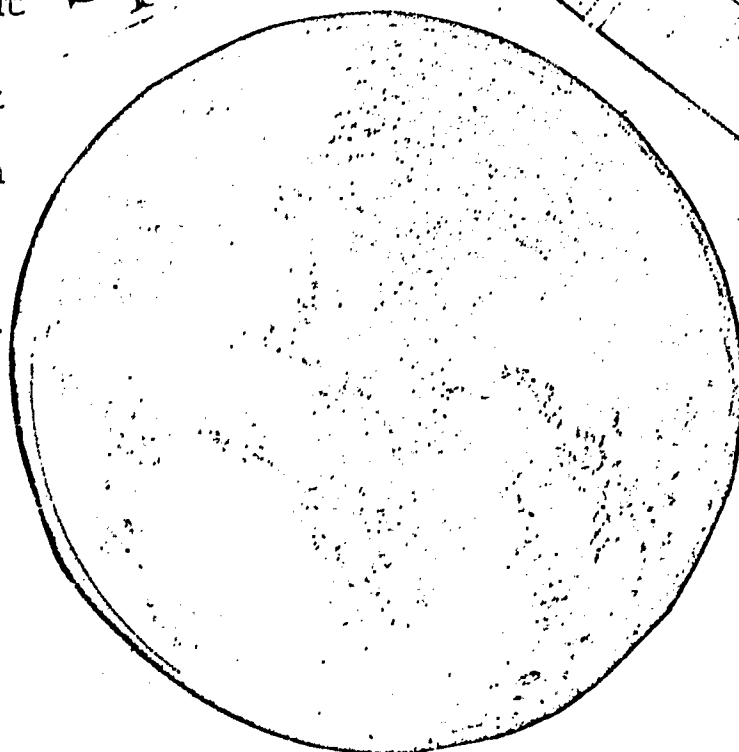
Still and motion picture photography have become the favored forms of artistic expression of a sizable segment of our young people.

(This is an instance of the natural way in which they make technology a part of their lives.) As an artistic medium photography provides the educational opportunities associated with other forms of art, opportunities for the development of the creative and perceptual faculties. But photography also turns out to have a great promise as a technology for learning, even in situations in which aesthetic goals are subordinate to the goals of learning specific subject matters.

Projects in the photographic media dealing with a wide range of subject matters can yield enormously powerful learning experiences. Let us take an example from the social sciences--a group of students (on almost any level) studying phenomena of poverty.

A photographic project, in which students attempted to capture the visible signs and effects of poverty, the images of the culture of poverty, could have tremendous educational rewards. One would expect such activities to sensitize the student to the sociological and economic significance of what he sees. And the photographic media would allow students to share their perceptions and thus to help each other to deal with the subject matter. The range of subjects in which such projects could be valuable

Space Age



Awesome

is large, including many areas in the arts and humanities as well as the sciences.

III.

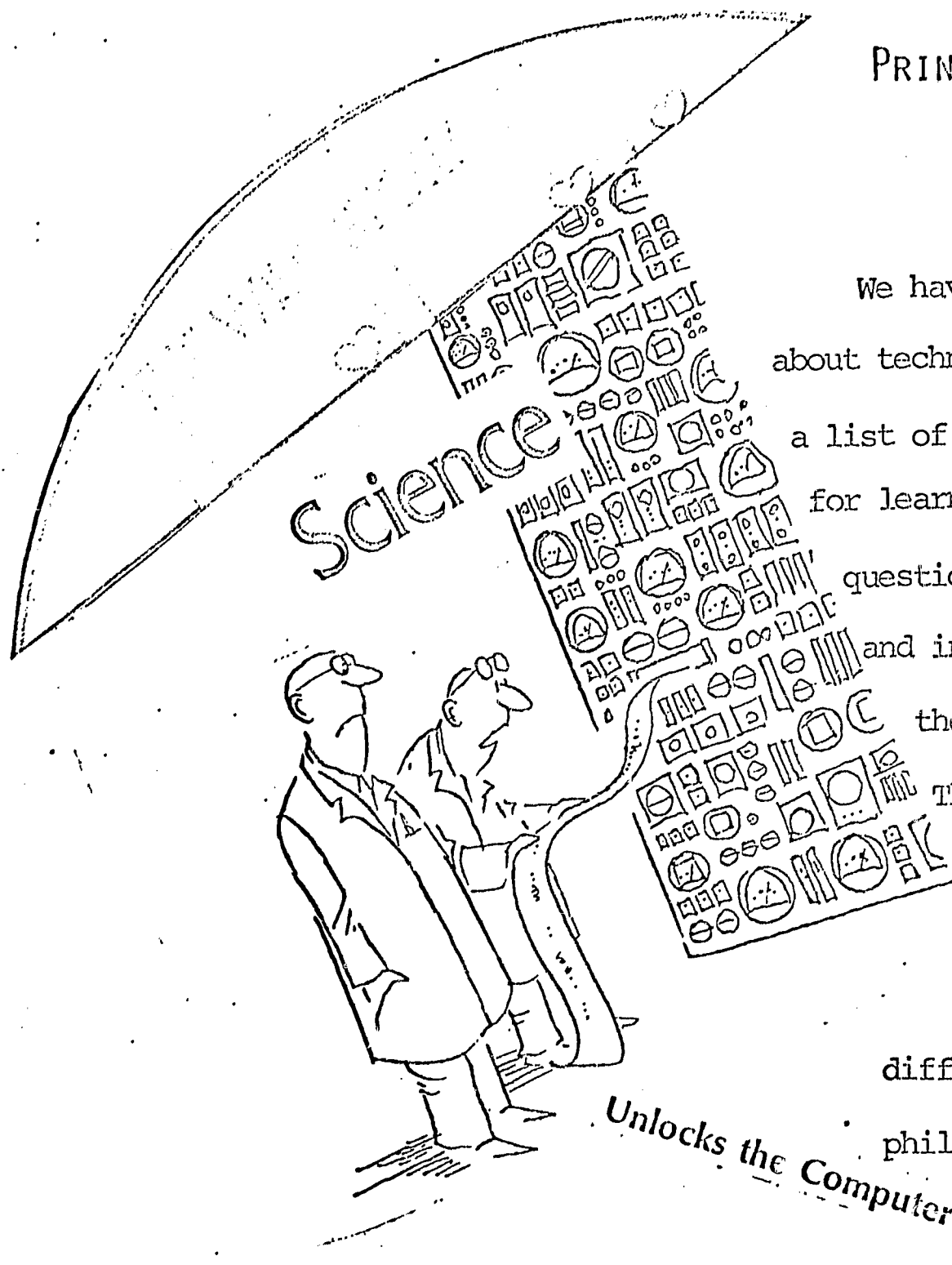
PRINCIPLES AND QUESTIONS

We have made some general remarks about technology, and we have formulated a list of contemporary technologies for learning. The remaining question is obvious: How, when, and in what configurations, are these technologies to be used? There is no simple answer, and the quest for an answer leads us to a consideration of some of the most

difficult problems of educational philosophy and practice. Consider, for example, the questions raised

by the range of possible relations between the technologies and the teacher.

Technologies for learning are often discussed as the means by which teachers are to be relieved of their petty and burdensome tasks; thus to be freed to attend to those parts of education which are truly central. The assumption is that the relationship of teacher to student is unalterably

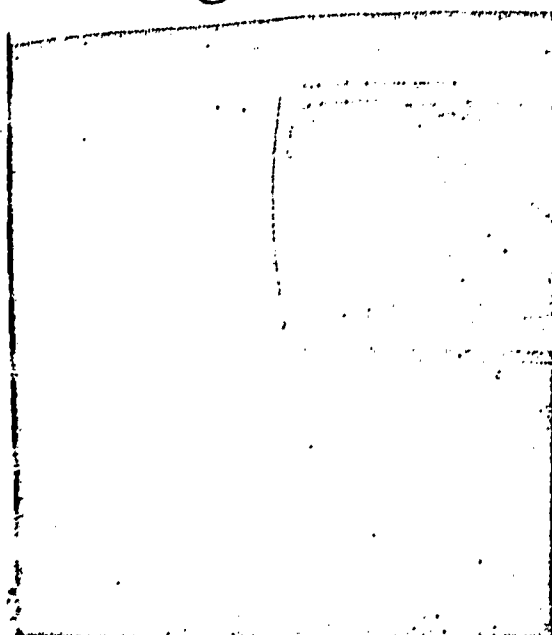


the major locus of education. Technology therefore may attend to the peripheral tasks, allowing for more time and energy to be devoted to the heart of the educational system, the interaction between teacher and student. This view of technology and of the educational process is widely held. It has also been used, consciously or unconsciously, to try to assure teachers that neither their importance nor their roles are to be changed by technological innovations.

But it is important to consider the possibility that the role of the teacher will change

dialogue

of young people is separate from the adult people may well be of what they learn and the mass media their parents and effect of rapid societal of experiences which



increasingly culture, and young learning more from each other rather than from teachers. A major change is the production are common to

younger generations but which are quite dissimilar from the experiences of older generations. These discontinuities, along with the availability of new communications technologies for learning, suggest that we might reconsider the familiar notion of the teacher's role in education.

To argue on a general level that the teacher must remain "central" to education or that he will be "displaced" does not make much sense. Before the real issues can be joined it is necessary to articulate the full range of a teacher's activities. Teachers have many roles. They

S

This Master Schedule is subject to change as circumstances necessitate. Please check mimeographed Master schedule addenda sheets before making course elections. The three-digit number preceding the course title (e.g., Art 100) is the catalog number. The four-digit number preceding the information about meeting time and place is the call number.

The arrangement of the schedule follows the order of the letter, i.e., alphabetically by area, within each area, by division; within each division, alphabetically by department; within each department, numerically by course.

Notations in parentheses indicate the credit value of the course. The course is listed by name. The titles indicate the credit value of the course. The titles indicate the credit value of the course.

Students are subject to possible dismissal under the Dismissal or Probation regulations may preregister. Matriculation does not take place until the student's official status has been determined by the appropriate Dean. (General Catalog, p. 40)

Rooms designated by the letters T, U, V, X, Y, Z are not actual rooms. Bacon Hall will undergo renovation during the 1969-70 academic year, making it necessary for the College to find new classroom space which has not yet been identified. Students and faculty will be notified at a later date as to the rooms the letter designations represent.

TO SYMBOLS AND ABBREVIATIONS

—Required Course	
—Elective Course	
—Permission of Instructor Required	
—Permission of Department Chairman Required	
9 M W F KH 313	C.E. Jauch
11 M W Th KH 106	J.M. Keech
12 M T Th KH 315	A.L. Bradford
2 M W Th KH 106	J.M. Keech
5 AMERICAN WRITERS I (3)	
10 F KH 110	D.W. Landrey
11 M W Th KH 300	S.R. Diner
12 M T Th KH 100	S.T. Dhondt
1 T W F CC E	D.W. Landrey
2 T KH 110 W F KH 313	S.J. Searl
3 T KH 106 W KH 116 F KH 212	S.J. Searl
3 M T W KH 212	S.T. Dhondt
4 M T F KH 300	J.S. Sherwin
6 AMERICAN WRITERS II (3)	
8 T W KH 315 9 M CC S2	B.F. Gronewold
9 W Th KH 315 9 M CC S2	B.F. Gronewold
10 T Th KH 315 9 M CC S2	B.F. Gronewold
1 ADVANCED COMPOSITION (3) (160 or equiv.)	
9 M W Th KH 319	E.J. Thomas
1 T Th KH 212	M.G. Carr
1 T Th KH 319	E.I. Schoenberg
13 MODERN DRAMA (3) (Basic course in Eng., Amer., or Wld. Lit.)	
1 T Th F KH 110	C.R. Bachman
15 WORLD LITERATURE I (3)	
8 T W F KH 110	C.W. Sauer
10 M W Th KH 116	E.J. Thomas
10 T KH 116 W KH 106 F KH 110	C.W. Sauer
11 T F KH 315 Th KH 313	M.C. Vucinich
11 M W Th KH 116	C.S. Trift
12 M T Th KH 116	P.L. Moore
12 M T Th KH 313	Staff
1 T Th F KH 315	M.C. Vucinich
1 M T Th KH 116	E.J. Thomas
1 T W Th KH 313	Staff
2 M T Th KH 116 (Not available for Preregistration)	P.L. Moore
3 T Th F KH 313	M.C. Vucinich
18 GENERAL FOLKLORE (3)	
2 M CC W2 TCC E Th CC S2	L.M. Fish
4 TWCC E2 Th CC S2	L.M. Fish
5 M W CC W2 2 Th CC S2	L.M. Fish
10 CHILDREN'S LITERATURE (3)	
8 T KH 300 Th KH 313 11 F CC N	H.R. Thielking
9 T W KH 300 11 F CC N	H.S. Ganey
10 M Th KH 300 11 F CC N	H.R. Thielking
11 M T KH 300 11 F CC N	H.R. Thielking
1 T Th KH 319 11 F CC N	H.R. Thielking
1 M KH 212 Th KH 300 11 F CC N	M.G. Carr
2 T KH 300 11 F CC N	M.G. Carr
3 T KH 212 11 F CC N	W.A. Donnelly
4 T KH 212 11 F CC N	M.G. Carr
19 AMERICAN MOVEMENT IN AMERICAN LITERATURE (3) (Basic course in Amer., or Wld. Lit.)	
10 T W F KH 313	H.O. Klomp
13 SECONDARY SCHOOL LITERATURE (3)	
2 M KH 212 T F KH 315	W.A. Donnelly
4 M T W KH 106	R.F. Mehl
14 WORLD LITERATURE II (3)	
8 T W F KH 313	H.O. Klomp
9 T W F KH 100	C.R. Bachman
9 M Th F KH 106	E.I. Schoenberg
10 T Th F KH 106	E.I. Schoenberg

convey information and help students to learn a great variety of skills. They approve of some things and disapprove of others, thus affecting students' value systems and personalities.

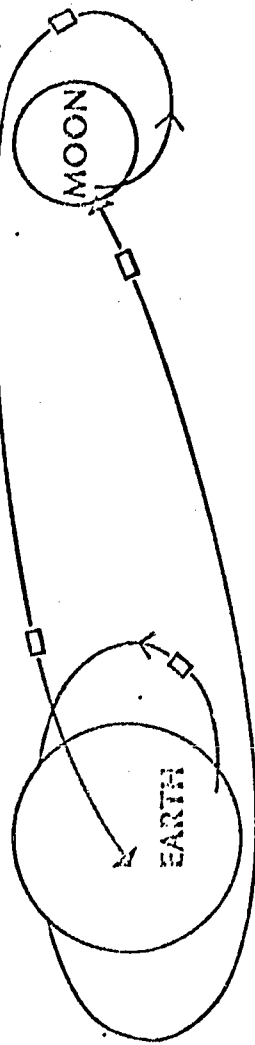
Teachers give advice and counsel, and they serve as adult models for many types of intellectual and emotional behavior. Teachers create social environments of various types within which their students live. This list can, no doubt, be extended.

Cultural change in general and technology in particular are bound to affect the conglomerate role of the teacher. New elements, e.g. the preparation of materials for further development by media experts, may be added. Old elements may be deleted, e.g. the detailed evaluation of a student's performance may pass largely from the teacher to a testing specialist. Surely emphasis will be redistributed among the various parts of a teacher's functions, e.g. training for skills and conveying information may be de-emphasized while attention to the problems of human relations may become more important.

We can be fairly sure that the meaning of teaching will change and that the change will be

intimately connected with the manner in which technologies for learning are deployed. We cannot know, at present, exactly what those changes will be. One thing that we can hope, however, is that the changes will be produced in a context in which a full range of alternatives has been explored.

We need to identify or create a large number of educational institutions that will use technologies and teachers in different ways. Some institutions might implement systems in which teachers



act out a radical change in emphasis among parts of their role, with technologies assuming some functions which traditionally have been served by teachers. Other schools might attempt a "symbiotic" approach between teacher and technologies in as many different functions as possible. There is a very large range of possible alternative configurations of human and non-human resources in the construction of learning environments. We are in a period in which

CAPITAL

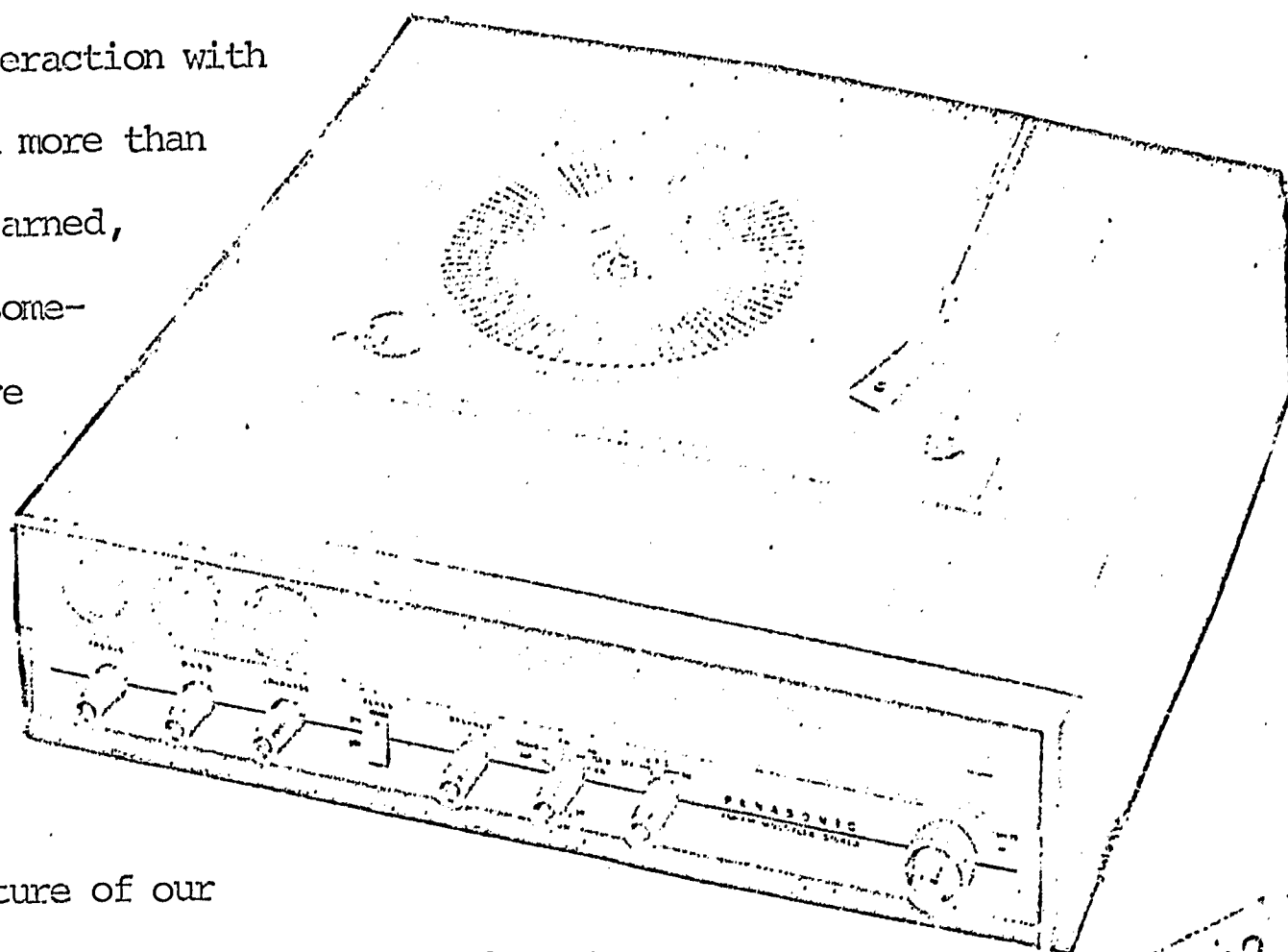
26. Units of Capital at beginning of period (from L. 11) UC

27. Capital imports: (trade) From	UC
28. (trade) From	UC
29. (aid) From	UC
30. (aid) From	UC
31. SUBTOTAL	(+)
32. Capital exports: (trade) To	UC
33. (trade) To	UC
34. (aid) To	UC
35. (aid) To	UC

UC

there are many resources that have not been fully tested and whose promise is not completely understood. In such a situation we must encourage the deployment of our capabilities in many configurations and patterns, so that our eventual choices will be informed ones.

There are factors to consider other than the teacher's role, as we experiment with new patterns of technology. For example, it would be an elementary mistake to confuse the process of learning about technology with the process of learning by means of technology. Nevertheless, the two processes are not entirely distinct. The child who learns arithmetic through interaction with a computer has learned more than arithmetic. He has learned, at least implicitly, something about the nature and potentials of computers. (And if the medium really is the message, he may have changed in more subtle ways.) The nature of our society requires that we help our students relate to technology in a positive and liberating way, perceiving both the threats and the promises of the technological parts of their environment. The technologies for learning may be among the major ones with which the student is involved. As we



How does Beethoven sound at 21,000 feet?

experiment with different patterns of technology, therefore, we must remember that we are serving these broader educational goals.

If students are to be offered an environment that is both technological and educational, that environment should probably be quite responsive to the student's initiatives, and initiatives should be easy and acceptable. Many of the technologies for learning are found to be most effective in helping students deal with subject matters when the student himself takes over and becomes the designer of materials and activities. Our usual pattern of using technology, however, is to begin with applications that assume a passive student. The technology is a medium of communication from an instructor. This is also the assumption of the people who manage the machines; the closer the student's hand is to the machine, the more uncomfortable the manager is. When this pattern is overcome we find that the specific goals of subject matter learning can be pursued more effectively, as well as the more general goal of helping students to understand and deal with technologies. (It should be noted that the force towards technological patterns which are accessible to student initiative may be opposed, in some circumstances, by the need for teachers to use the technologies in professional and highly polished ways. Compromises in equipment and costs may be especially difficult when both of these desiderata are kept in mind.)

Before we conclude, let us mention two perennial questions in educational philosophy. These issues must be dealt with in almost any

RECEIVED

FREEDOM.

Will never go out of style.

31.

meaningful discussion of education, and a consideration of technologies for learning is no exception. As we consider and experiment with different configurations of learning resources, we must take a position, firstly, on the extent to which education is to be directed by the learner. The second question is related: What are the appropriate contemporary curricular and subject matter categories? These two issues are related, for a position in favor of traditional or disciplinary categories will usually imply methods which are strongly teacher directed; teachers (but not students), after all, are trained in and for the most part committed to those categories. If, on the other hand, one allows for unconventional curricular categories, learner-directed processes may make more sense.

The technologies can be used to create an educational environment in which the student's behavior is carefully controlled. They can also create an environment of great choice and student self-direction. Similarly we can use technologies in the service of standard subject matters or in programs involving other curricular categories. Our commitments in these matters will, to some extent, influence the technologies we use and the ways we use them. Programed instruction may be neutral with respect to both these issues, and can be used in many ways. Network television, on the other hand, is not neutral with respect to curricular categories; it is not likely to support the traditional subject

matter divisions, but it would support new ones. Sensitivity training, if it is an important part of an educational system, would be likely to reinforce student direction of learning but not commitment to our normal subject matter divisions. It would be possible to try to characterize all of the available technologies for learning in the light of these and other basic questions of educational philosophy.

How's that for talking your language?

The task that faces the educational community is the articulation, by experimentation and use, of the nature and possible uses of the available technologies. This must involve the construction of a wide range of educational environments, the deployment of human and technological resources in many configurations. And these attempts must be viewed from the perspective of all of the most basic questions that we can ask about education.

As we experiment with uses of technology, we must resist a simplistic view of the venture. Technologies are more than means to ends. They change our goals, for they change our very natures as organisms. I believe that educators can not refrain from extensive technological innovation. In doing so, however, they must sensitize themselves to the fact that the changes will ramify in profound and unpredicted ways.

STOP

Technology